

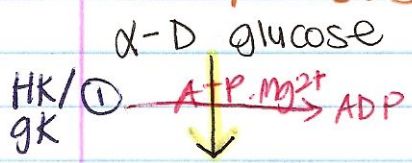
# GLYCOLYSIS

Regulatory: ①, ③, ⑩

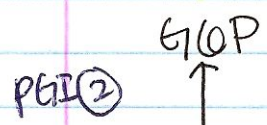
Investment  
input of ATP  
Committed  
step

Oxidoreduction  
formation of ATP

an aerobic  
condition:  
homolactic  
fermentation



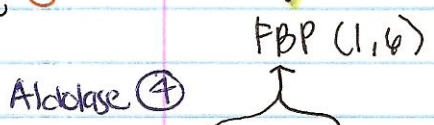
① Hexokinase/Glucokinase: on C<sub>6</sub>  
(liver)  
Irreversible; lower energy phosphate compound.  
 $\Delta G^\circ = -4.0$



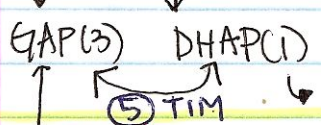
② phosphohexose isomerase: glu  $\rightarrow$  frut.  
(aldose  $\rightarrow$  ketose)  
 $\Delta G^\circ = 0.4$



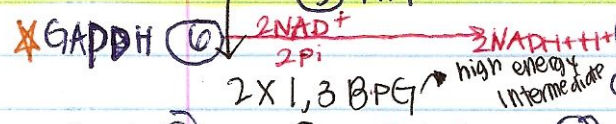
③ phosphofructokinase: on C<sub>1</sub>  
• Irreversible, Impt. Regulatory/control pt. of glycolysis  
•  $\oplus$  AMP, F2,6 BP,  $P_i$ ,  $\ominus$  ATP (allosteric), citrate, fatty acids  
 $\Delta G^\circ = -3.4$



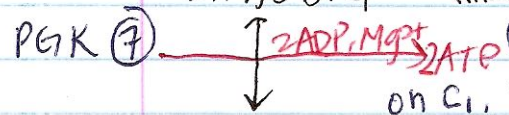
④ Aldolase: cleaves btwn C<sub>3</sub> + C<sub>4</sub>  
• G3P is removed @ later step to pull Rxn forward.  
 $\Delta G^\circ = +5.73$



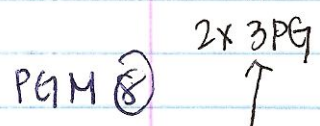
⑤ phosphatidase isomerase: to GAP (ketose  $\rightarrow$  aldose)  
 $\Delta G^\circ = +1.83$   
Role in glycerol phosphate shuttle



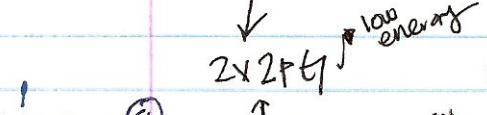
⑥ Glyceraldehyde 3-P dehydrogenase: addition of  $P_i$  on C<sub>1</sub> & 2  $NADH + H^+$  formed. Pull forward by sub. rxn.  
 $\Delta G^\circ = 1.5$



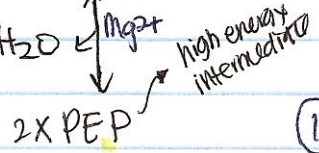
⑦ Phosphoglycerate kinase: substrate level phosphorylation on C<sub>1</sub>, highly exergonic pulls previous Rxn forward.  
 $\Delta G^\circ = -3.0$   
 $\Delta G^\circ = -4.5$



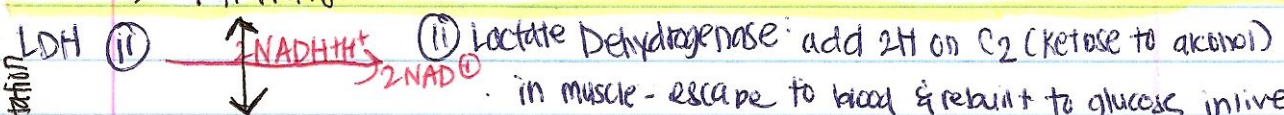
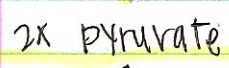
⑧ Phosphoglycerate mutase: move phosphoryl group from C<sub>3</sub>  $\rightarrow$  C<sub>2</sub>  
 $\Delta G^\circ = 1.06$



⑨ enolase: double bond btwn C<sub>2</sub>-C<sub>3</sub> lose 1  $H_2O$   
 $\Delta G^\circ = 0.44$   
 $\ominus$  F0  
more oxidized  $\rightarrow$  more reduced



⑩ Pyruvate kinase: substrate level phosphorylation @ C<sub>2</sub>  
Regulatory:  $\oplus$  F1,6 BP,  $\ominus$  ATP, glucagon, fatty acids pulls Rxn forward  
 $\Delta G^\circ = -7.5$



⑪ Lactate Dehydrogenase: add 2H on C<sub>2</sub> (ketose to alcohol)  
in muscle - escape to blood & rebuilt to glucose in liver in recovery. Allow glycolysis to continue by regenerating  $NAD^+$ . Cite-f source of energy in RBC. Freely Reversible  
 $\Delta G^\circ = -6.0$

